CERTIFICATE OF SERVICE

I hereby certify that I have caused a copy of the foregoing ORDER (U.S. EPA Docket No.: RCRA-06-2001-0908) to be served upon the person(s) designated below on the date below, by causing said copy to be deposited in the U.S. Mail, First Class (express mail certified, Return Receipt Requested, postage prepaid), at Dallas, Texas, in an envelope addressed to:

Mr. Greg W. BeVier, President PIC Americas
PIC International Group, Inc.
3033 Nashville Road
Franklin, Kentucky 42134

I have further caused the original and one copy of said ORDER and the Certificate of Service to be filed with the Regional Hearing Clerk, United States Environmental Protection Agency, 1445 Ross Avenue, Suite 1200, Dallas, TX 75202-2733 on the date specified below.

Dated this 26th day of _____ 2001.

Timothy T. Jones
Assistant Regional Counsel

Exhibits

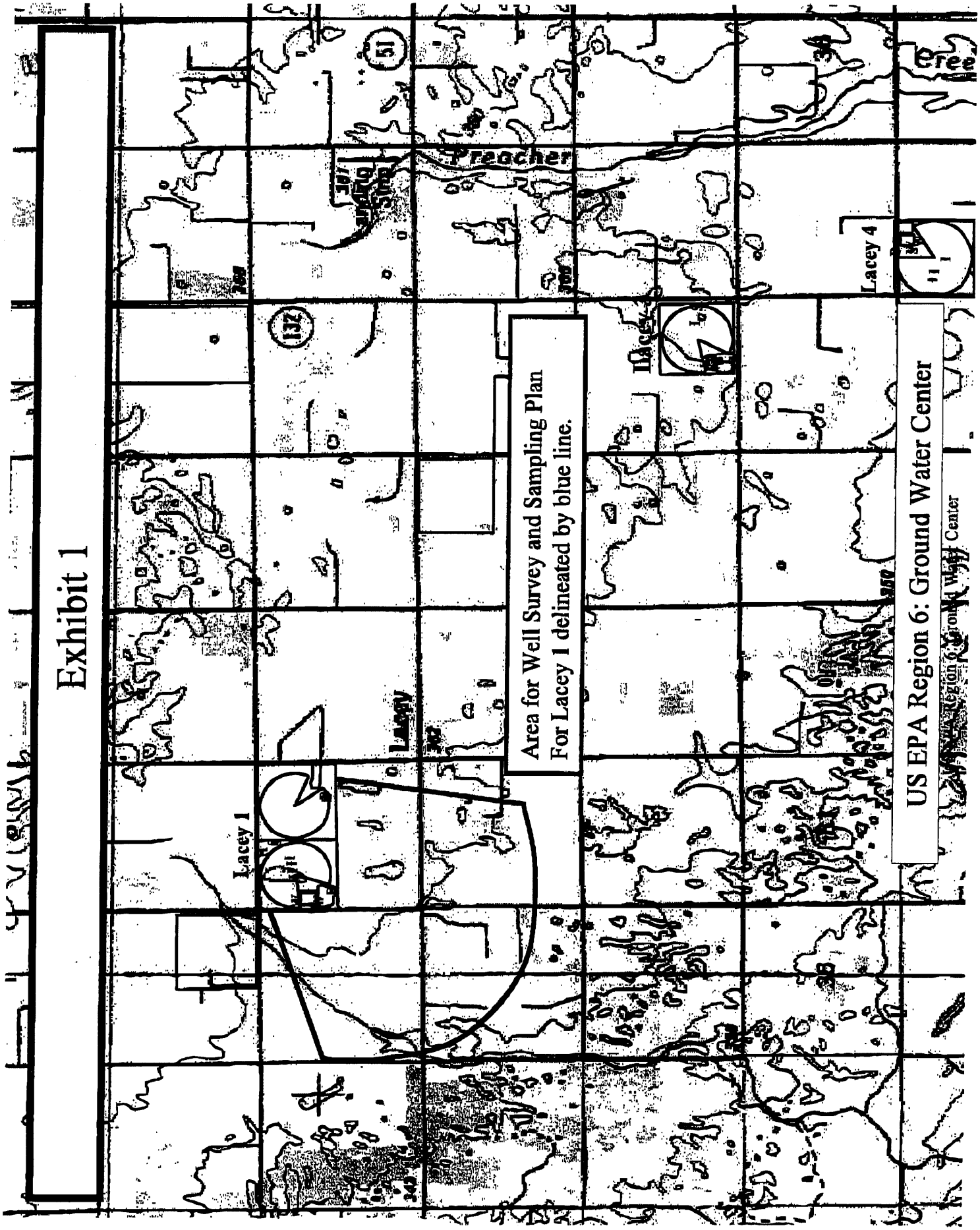


Exhibit 1
Area for Well Survey and Sampling Plan
For Lacey 1 delineated by blue line.
US EPA Region 6: Ground Water Center
Lacey 1
Lacey 4
Preacher
Lacey

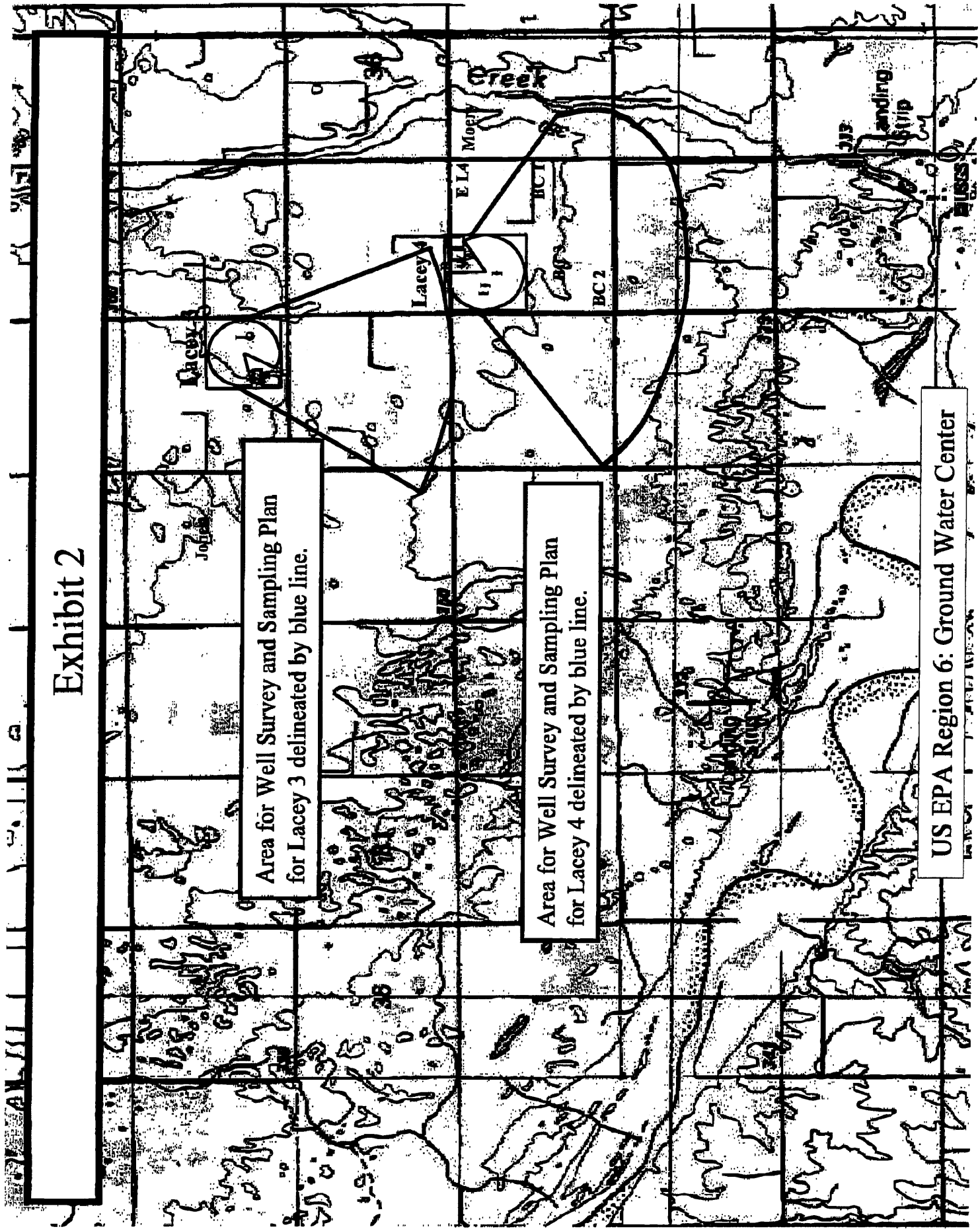


Exhibit 2
Area for Well Survey and Sampling Plan for Lacey 3 delineated by blue line.
Area for Well Survey and Sampling Plan for Lacey 4 delineated by blue line.
US EPA Region 6: Ground Water Center
Lacey
Lacey
Creek
Landing
BC 1
BC 2

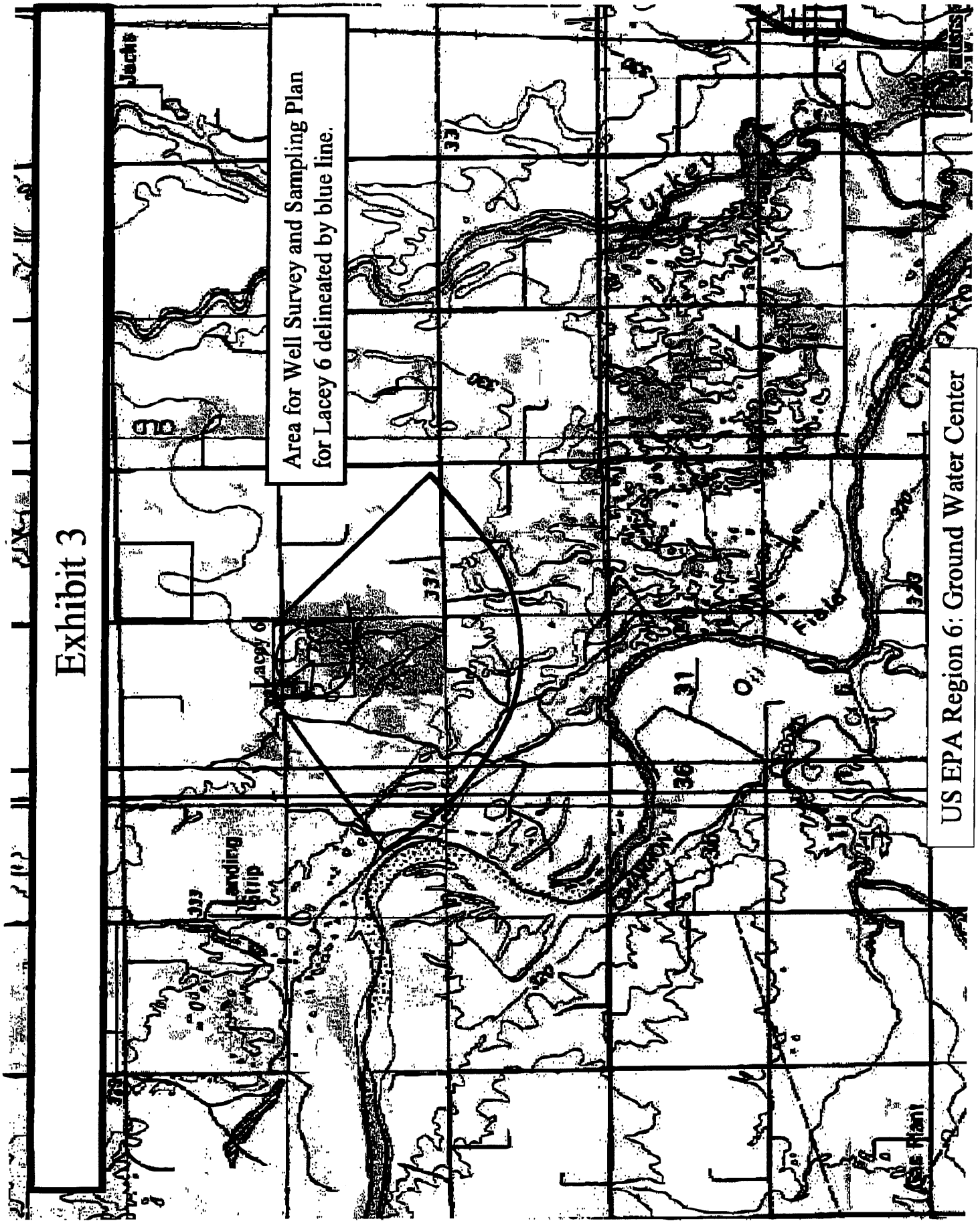
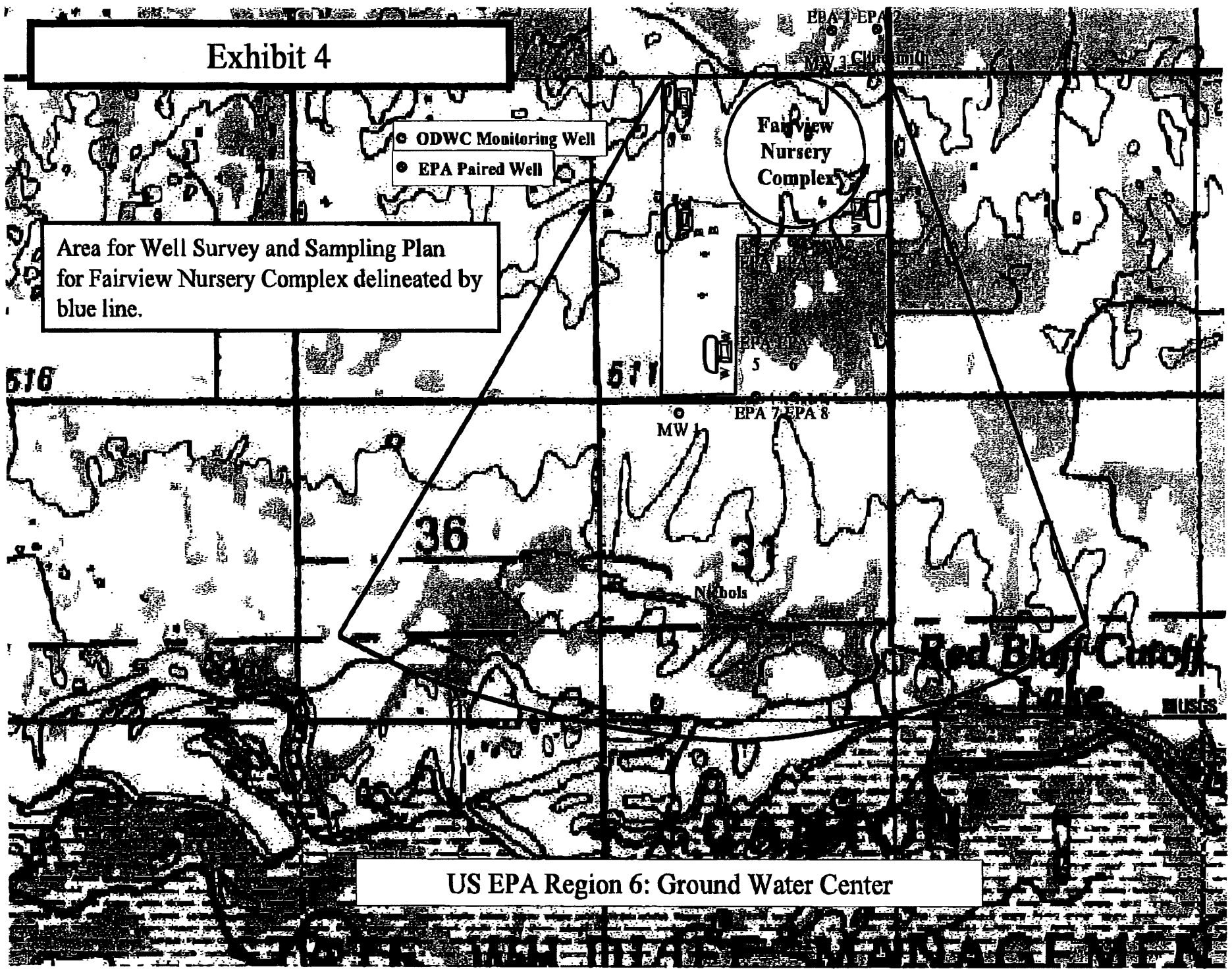


Exhibit 3
Area for Well Survey and Sampling Plan
for Lacey 6 delineated by blue line.
US EPA Region 6: Ground Water Center

Exhibit 4


ODWC Monitoring Well
EPA Paired Well
Fairview Nursery Complex
Area for Well Survey and Sampling Plan for Fairview Nursery Complex delineated by blue line.
EPA 1
EPA 2
MW 3
EPA 5
EPA 7
EPA 8
MW 1
516
511
36
31
Nichols
Red Bluff Cutoff Lake
USGS
US EPA Region 6: Ground Water Center

ATTACHMENT
REMEDIAL ACTION PLAN

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I. COMMON DEFINITIONS

A. LOCATION IS TO INCLUDE:

1. Vertical location including a common working datum such as sea level.
2. Horizontal coordinates to be in decimal degrees, with referenced meridian and spheroid systems and/or properly scaled on a map with reference coordinates.

II. FIELD ANALYSIS (FA)

A. PURPOSE

The purpose of this Field Analysis (FA) is to determine the nature and extent of contamination of solid waste at the Facilities and to gather all necessary data to support the Remedial Procedures Analysis. The Respondents shall furnish all personnel, materials, and services necessary for, or incidental to, performing the FA at the Facilities.

B. SCOPE

The FA consists of six tasks:

1. FA Workplan
2. Facilities Investigation
3. Human Health and Ecological Risk Assessment
4. Investigation Analysis
5. Treatability Studies
6. Progress Reports

C. FA WORKPLAN REQUIREMENTS

The Respondents shall prepare a Final FA Workplan in accordance with the Order. The FA Workplan shall include the development of several distinct plans, which shall be prepared concurrently. The FA Workplan as approved or modified by the EPA shall become the Final FA Workplan. During the FA, it may be necessary to revise the Final FA Workplan to accommodate a Facility specific situation. The FA Workplan shall include the following:

1. Project Management Plan

The Respondents shall prepare a Project Management Plan, which will include a discussion of the technical approach, schedules, budget, and necessary personnel. The technical approach shall include the rationale for investigation of each media (ground water and surface water) and a description of each area of concern which may have contamination from the Facilities activities. The technical approach shall address all

the requirements set forth in I. E. Human health and ecological risk assessment of this Remedial Action Plan. The Project Management Plan shall also include a description of qualifications of personnel performing or directing the FA. The Project Management Plan shall also document the overall management approach to the FA.

2. Biosecurity Plan

The Respondents shall prepare a Biosecurity Plan to document all decontamination procedures, prevention methods and site visitation order necessary to protect livestock.

3. Data Collection Quality Assurance Plan

The Respondents shall prepare a Data Collection Quality Assurance Plan to document and guide the conduct of all monitoring procedures, including: sampling, field measurements, and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented.

a. Data Collection Strategy

The Data Collection Strategy shall include, but not be limited to, the following:

(1) Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

(2) Description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;

(3) Description of the methodology used to assure that the data accurately and precisely represent the characteristics of a population, parameter variations at a sampling point, and process conditions or environmental conditions.

(a) Examples of factors which shall be considered and discussed include:

i) Environmental conditions at the time of sampling;
ii) Number of sampling points;
iii) Representativeness of selected media; and
iv) Representativeness of selected analytical parameters.

(4) Description of the measures to be taken to assure that the following data sets can be compared to each other:

(a) FA data generated by the Respondents;

(b) FA data generated by parties other than the Respondents;

(c) Data previously generated by Respondents or Respondents' agents.

(5) Details relating to the schedule and information to be provided in quality assurance reports. The reports shall include but not be limited to:

(a) Periodic assessment of measurement data accuracy, precision, and completeness;

(b) Results of performance audits;

(c) Results of system audits;

(d) Significant quality assurance problems and recommended solutions; and

(e) Resolutions of previously stated problems.

b. Sampling

The Sampling Strategy shall discuss:

(1) Selecting appropriate sampling locations, depths, etc.;

(2) Determining a statistically sufficient number of sampling sites;

(3) Measuring all necessary ancillary data;

(4) Determining conditions under which sampling will be conducted;

(5) Determining which media are to be sampled (e.g., ground water, sediment, etc.);

(6) Determining which parameters are to be measured and where;

(7) Selecting the frequency of sampling and length of sampling period;

(8) Selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;

(9) Documenting field sampling operations and procedures, including:

(a) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);

(b) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

(c) Documentation of specific sample preservation method;

(d) Calibration of field devices;

(e) Collection of replicate samples;

(f) Submission of field-based blanks, where appropriate;

(g) Potential interferences present at the Facilities;

(h) Construction materials and techniques, associated with monitoring wells and piezometers;

(i) Field equipment listing and sample containers;

(j) Sampling order; and

(k) Decontamination procedures.

(10) Selecting appropriate sample containers;

(11) Sample preservation; and

(12) Chain-of-custody, including:

(a) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

(b) Pre-prepared sample labels containing all information necessary for effective sample tracking.

c. Field Measurements

The Field Measurements Strategy shall discuss:

(1) Selecting appropriate field measurement locations, depths, etc.;

(2) Providing a statistically sufficient number of field measurements;

(3) Measuring all necessary ancillary data;

(4) Determining conditions under which field measurement should be conducted;

(5) Determining which media are to be addressed by appropriate field measurements (e.g., ground water, sediment, etc.);

(6) Determining which parameters are to be measured and where;

(7) Selecting the frequency of field measurement and length of field measurements period; and

(8) Documenting field measurement operations and procedures, including:

(a) Procedures and forms for recording raw data and the exact location, time, and Facility-specific considerations associated with the data acquisition;

(b) Calibration of field devices;

(c) Collection of replicate measurements;

(d) Submission of field-biased blanks, where appropriate;

(e) Potential interferences present at the Facilities;

(f) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;

(g) Field equipment listing;

(h) Order in which field measurements were made; and

(i) Decontamination procedures.

d. Contaminated Material Disposal

All solid waste material generated by activities required in the FA shall be disposed of in accordance with all state and federal regulations.

e. Sample Analysis

The Sample Analysis Strategy shall specify the following:

(1) Chain-of-custody procedures, including:

(a) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

(b) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

(c) Specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.

(2) Sample storage procedures and holding times;

(3) Sample preparation methods;

(4) Analytical procedures, including:

(a) Scope and application of the procedure;

(b) Sample matrix;

(c) Potential interferences;

(d) Precision and accuracy of the methodology;

(e) Method detection limits;

(f) Calibration procedures and frequency;

(g) Data reduction, validation and reporting;

(h) Internal quality control checks, laboratory performance and systems audits and frequency, including:

i) Method blank(s);
ii) Laboratory control sample(s);
iii) Calibration check sample(s);
iv) Replicate sample(s);
v) Matrix-spiked sample(s);
vi) "Blind" quality control sample(s);

(i) Preventive maintenance procedures and schedules;

(j) Remedial action (for laboratory problems); and

(k) Turnaround time.

4. Data Management Plan

The Respondents shall develop and implement a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the FA.

a. Data Record

The data record shall include, but not be limited to, the following:

(1) Unique sample or field measurement code;

(2) Sampling or field measurement location and sample or measurement type;

(3) Sampling or field measurement raw data;

(4) Laboratory analysis ID number;

(5) Property or component measured; and

(6) Result of analysis (e.g., concentration).

b. Tabular Displays

The following data shall be presented in tabular displays:

(1) Unsorted (raw) data;

(2) Results for each medium, or for each constituent monitored;

(3) Data reduction for statistical analysis;

(4) Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

(5) Summary data.

c. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

(1) Display sampling locations and sampling grids;

(2) Boundaries of sampling areas, and areas where more sampling is required;

(3) Levels of contamination at each sampling location;

(4) Geographical extent of contamination;

(5) Display contamination levels, averages, and maxima;

(6) Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters;

(7) Indicate features affecting intra media transport and show potential receptors; and

(8) Illustrate the structural geology in the area of the Facilities, including detailed structural geology of the Facilities.

5. Health and Safety Plan

The Respondents shall prepare and implement a Health and Safety Plan for FA activities at the Facilities.

a. Major elements of the Health and Safety Plan shall include, but not be limited to, the following:

(1) Facilities descriptions, including availability of resources such as roads, water supply, electricity and telephone service;

(2) Describe the known hazards and evaluate the risks associated with each activity conducted, including, but not limited to on and off-site exposure to contaminants during the implementation of initial actions at the Facilities;

(3) Describe the hazards of biocontamination associated with each activity;

(4) List key personnel and alternates responsible for site safety, response operations, and for protection of public health;

(5) Delineate work areas;

(6) Describe levels of protection to be worn by personnel in work area;

(7) Establish procedures to control site access;

(8) Describe decontamination procedures for personnel and equipment;

(9) Establish site emergency procedures;

(10) Address emergency medical procedures for injuries and toxicological problems;

(11) Describe requirements for an environmental surveillance program;

(12) Specify any routine and special training required for responders; and

(13) Establish procedures for protecting workers from weather-related problems.

b. The Health and Safety Plan shall be consistent with:

(1) NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

(2) EPA Order 1440.1 - Respiratory Protection;

(3) EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

(4) Facility Contingency Plan;

(5) EPA Standard Operating Safety Guide (1984);

(6) OSHA regulations particularly in 29 CFR 1910 and 1926;

(7) State and local regulations; and

(8) Other EPA guidance as provided.

6. Community Relations Plan

The Respondents shall prepare a Community Relations Plan for the dissemination of information to the public regarding FA activities and results.

D. FACILITIES INVESTIGATION (FI)

The Respondents shall conduct those investigations necessary to: characterize the Facilities (Environmental Setting); define the source(s) of contamination (Source Characterization);

define the degree and extent of contamination (Contamination Characterization); and identify actual or potential receptors.

The investigations should result in data of adequate technical quality to support the development and evaluation of the alternatives during the Remedial Procedures Analysis.

The Facilities investigation activities shall be conducted in accordance with the FA Workplan. All sampling and analyses shall be conducted in accordance with the Data Collection Quality Assurance Plan.

At the conclusion of the Facilities investigations, the Respondents shall prepare and submit to the EPA for review and approval an FA Report, which shall contain an analysis and a summary of all the Facilities investigations implemented pursuant to the requirements of this section. The EPA will approve or modify and approve the FA Report.

1. Environmental Setting

The Respondents shall collect information to supplement and verify existing information on the environmental setting at the Facilities. The Respondents shall characterize the following:

a. Hydrogeology

The Respondents shall prepare a report evaluating hydrogeologic conditions at the Facilities. This report shall be included in the FA Report and shall provide the following information:

(1) A description of the regional and Facility specific geologic and hydrogeologic characteristics affecting ground water flow beneath the Facilities, including:

(a) Regional and Facility specific stratigraphy;

(b) Regional structural geology;

(c) Depositional history;

(d) Identification and characterization of areas and amounts of recharge and discharge;

(e) Regional and Facility specific ground water flow patterns; and

(f) Seasonal variation in ground water flow patterns.

(2) An analysis of any topographic features that might influence the ground water flow system;

(3) Based on field data, tests, (piezometers and borings) and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the Facilities (i.e., the aquifers and any intervening saturated and unsaturated units), including:

(a) Hydraulic conductivity and porosity (total and effective);

(b) Lithology, grain size, sorting, degree of cementation;

(c) An interpretation of hydraulic interconnections between saturated zones; and

(d) The attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content etc.).

(4) Based on field studies and cores, structural geology and hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways identifying:

(a) Sand and gravel deposits in unconsolidated deposits;

(b) Zones of fracturing or channeling in consolidated or unconsolidated deposits; and

(c) Zones of higher permeability or lower permeability that might direct or restrict the flow of contaminants;

(5) Based on data obtained from ground water monitoring wells and piezometers installed up gradient and down-gradient of the potential contaminant source and associated contaminent plume, a representative description of water level or fluid pressure monitoring including:

(a) Water-level contour and/or potentiometric maps;

(b) Hydrologic cross sections showing vertical gradients;

(c) The flow system, including the vertical and horizontal components of flow;

(d) Any temporal changes in hydraulic gradients, due to seasonal influences; and

(e) Create flow net maps using well cluster data.

(f) All maps will be at an appropriate, common depth datum such as mean sea level.

(6) A description of man-made influences that may affect the hydrogeology of the Facilities, identifying:

(a) Active and inactive local water-supply and production wells with an approximate schedule of pumping;

(b) Manmade hydraulic structures (pipelines, french drains, ditches, etc.); and

(c) Irrigation systems (pivot, hardhose, etc.).

b. Surface Water and Sediment

The Respondents shall conduct a program to characterize any marshes, creeks, wetland areas, or ditches surrounding and crossing the Facilities. Such characterization shall include, but not be limited to, the following activities and information:

(1) Description of the temporal and permanent surface water bodies including:

(a) For all local wetland areas, ditches, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e., 100 year event);

(b) Drainage patterns; and

(c) Evapotranspiration rates.

(2) Description of the chemistry of surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biochemical oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total organic carbon, and specific contaminant concentrations, as proposed by the Respondents and approved by the EPA;

(3) Description of sediment characteristics including:

(a) Deposition area;

(b) Thickness profile; and

(c) Physical parameters (e.g., grain size, density, ion exchange capacity, etc.).

2. Source Characterization

Respondents shall document and quantify in the FA Report the following specific characteristics at all known source areas of solid waste subsequent to May 1993 and to the extent known or ascertainable for periods prior thereto:

a. Source Area characteristics:

(1) Location of area;

(2) Type of area;

(3) Design features;

(4) Operating practices (past and present);

(5) Period of operation;

(6) Age of area;

(7) General physical conditions.

(8) Any permit and/or certifications.

b. Waste and Effluent Characteristics:

(1) Physical and chemical characteristics of the wastes and effluent:

(a) Physical form (solid, liquid, gas);

(b) Physical description (e.g., powder, oily sludge);

(c) Chemical characteristics (e.g., cations, anions, pH, conductivity);

(d) Heavy metal concentrations (e.g., arsenic, copper, barium, chromium, fluoride, selenium and zinc);

(e) Concentrations of pharmaceuticals (e.g., used in operations) and

(f) Density.

(2) Migration and dispersal characteristics of the waste;

(a) Sorption;

(b) Biodegradability, bioconcentration, biotransformation;

(c) Hydrolysis rates; and

(d) Chemical transformations.

The Respondents shall document the procedures used in making the above determinations.

3. Contamination Characterization

The Respondents shall collect analytical data on ground water, soils, surface water and sediment contamination in the vicinity of the Facilities and include said data in the FA Report. These data shall be sufficient to define the extent, origin(s), direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling,

media sampled, concentrations found, and conditions during sampling, and the identity of the individuals performing the sampling and analysis. The Respondents shall prepare for the FA Report maps that indicate the extent of contamination within all media. The Respondents shall address the following types of contamination at the Facilities:

a. Ground Water Contamination

Respondents shall characterize the vertical and horizontal extent of the ground water contamination plumes. This characterization must include monitoring wells completed with the screened interval 5' above to 10' below the top of the saturated zone in the surficial aquifers as well as monitoring wells completed at various depths dependent upon hydrogeological conditions. Characterization of the plumes beyond each of the Facilities boundaries shall be conducted with a program utilizing present monitoring wells, additional wells and borings. This investigation shall at a minimum provide the following information:

(1) A description of the horizontal and vertical extent of any contaminant plume(s) originating from the Facilities;

(2) The horizontal and vertical direction of contamination movement;

(3) The velocity of the ground water;

(4) An evaluation of factors influencing the plume(s) movement;

(5) An extrapolation of future contaminant movement; and

(6) Maps of all areas included in the soil investigation which are at a scale of approximately one inch to fifty (50) feet.

The Respondents shall document the procedures used in making the above determinations (e.g., well design, well construction, geophysics, modeling, etc.).

b. Surface Water and Sediment Contamination

The Respondents shall conduct a surface water and sediment investigation to characterize contamination at the Facilities.

The investigation shall include, but not be limited to, the following information:

(1) A description of the horizontal and vertical extent of any contamination plume(s) originating from the Facilities, and the extent of contamination in underlying sediments;

(2) The horizontal and vertical direction of contaminant movement;

(3) The contaminant velocity;

(4) An evaluation of the physical, biological and chemical factors influencing contaminant movement;

(5) An extrapolation of future contaminant movement;

(6) The surface water and sediment investigation must include the following to ensure adequate assessment of contaminants at or near the Facilities:

(a) Samples of any ponded water bodies inside the Facilities boundaries and immediately outside the Facilities boundaries;

(b) Samples from drainage ditches, culverts, etc., which accept water from the Facilities and drain to wetland areas;

(c) Samples from wetland area, at or near the Facilities property boundaries;

(d) Samples from wetland areas, if it is determined that contaminated constituents may have reached these areas; and

(e) Analysis of samples for general water quality parameters, and should at minimum, include temperature, pH, dissolved oxygen (DO), conductivity, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), and nutrients.

(7) Maps for all areas included in the surface water and sediment investigation which are on a scale of approximately one inch to 50 feet.

The Respondents shall document the procedures used in making the above determinations.

c. Wetlands Monitoring

Respondents shall investigate all wetland areas as, defined by Section 404 of the Clean Water Act, at or near the Facilities property boundaries. Respondents shall determine if contamination has reached any wetland areas with a sampling and analysis plan designed to characterize the physical and chemical nature of surface water, sediments, soils, and contaminants.

4. Potential Receptors Identification

The Respondents shall collect all available data describing the human populations and environmental systems that are susceptible to contaminant exposure from the Facilities. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained. The following characteristics shall be identified:

a. Ground Water Uses: Local uses and possible future uses (in addition to being a drinking water source) of ground water:

(1) Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial) for each aquifer around and beneath the Facilities; and

(2) Location of ground water users, including wells and discharge areas.

b. Surface Water Uses: Local uses and possible future uses of surface waters draining from the Facilities:

(1) Domestic and municipal (e.g., potable and lawn/gardening watering);

(2) Recreational (e.g., swimming, fishing);

(3) Agricultural;

(4) Industrial; and

(5) Environmental (e.g., fish and wildlife propagation).

c. Human Use: Human use of or access to the Facilities and adjacent lands, including but not limited to:

(1) Facilities operations;

(2) Recreation;

(3) Hunting;

(4) Residential;

(5) Commercial;

(6) Zoning; and

(7) Relationship between population locations and prevailing wind direction.

d. Other Receptors:

(1) A description of the biota in surface water bodies on, adjacent to, or affected by the Facilities.

(2) A description of the ecology overlying and adjacent to the Facilities.

(3) A demographic profile of the people who use or have access to the Facilities and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

(4) A description of any endangered or threatened species near the Facilities.

E. HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Concurrent with submission of the FA Report, the Respondents shall submit to the EPA for review and approval a baseline risk assessment for the potential human health and environmental risks posed by the site in the absence of any remedial action.

1. Human Health Risk Assessment

   a. Contaminant Identification: The Respondents shall review available information on the solid waste present at the site and identify the major contaminants of concern, which is defined to include associated pathogens. Contaminants of concern should be selected based on their intrinsic toxicological properties because they are present in large quantities, and/or because they are currently in, or potentially may migrate into, critical exposure pathways.

   b. Exposure Assessment: The Respondents shall identify actual or potential exposure pathways, characterize potentially exposed populations, and evaluate the actual or potential extent of exposure.

   c. Toxicity Assessment: The Respondents shall provide a toxicity assessment of those chemicals found to be of concern during site investigation activities. This will involve an assessment of the types of adverse health effects associated with chemical exposures, the relationships between magnitude of exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity.

   d. Risk Characterization: The Respondents shall integrate information developed during the exposure and toxicity assessments to characterize the current or potential risk to human health posed by the site. This characterization should identify the potential for adverse health effects for the chemicals of concern and identify any uncertainties associated with contaminant(s), toxicity(ies), and/or exposure assumptions.

2. Ecological Risk Assessment

   a. Problem Formulation: The Respondents shall perform problem formulation to characterize relevant ecological information about the sites, identify contaminants and receptors likely to be present and identify potential effects that may occur. The outcome of the problem formulation component will be site specific conceptual models describing pathways for contaminants, receptors of concern, expected linkages between site-related contaminants and ecological receptors that will be evaluated and effects that may be expected. Assessment endpoints and measurement endpoints will be identified as well as the hypotheses and objectives that will be evaluated.

b. Exposure Assessment: The Respondents shall perform an exposure assessment to document contamination, migration and fate of contaminants and identify contaminants of concern. Biological receptors and their important habitats will be identified. The magnitude and the extent of exposure of contaminants of concern to receptors of concern will be documented.

c. Ecological Effects Assessment: The Respondents shall perform an ecological effects assessment including compilation of information on past studies of the toxicity of contaminants of concern to organisms of concern for the sites and will conduct site specific studies to document effects (e.g., toxicity testing, community or population measurements, tissue residue analyses, and/or other biological effects measurements).

d. Ecological Risk Characterization: The Respondents shall perform ecological risk characterization by comparing exposure and effects information to assess the potential or actual effects at or near the site. Uncertainties in the ecological risk assessment process will be identified in this stage. This ecological risk characterization step will also be used to develop recommendations for ecologically protective clean-up levels, to evaluate any proposed remedial actions for their ability to reduce risk, and to identify further monitoring to document remedy effectiveness.

F. TREATABILITY STUDIES

The Respondents shall complete a Treatability Studies (TS) Program if so directed by the EPA. Treatability studies are performed to determine the applicability of remedial procedure technologies to conditions and problems at or resulting from the Facilities. In addition, if applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. Where it is determined by the EPA that treatability testing is required, the Respondents shall complete the activities described in this section.

1. Determine Candidate Technologies The Respondents will identify candidate technologies for a TS program in the Draft Report: Description of Current Conditions (section II. C. FA Workplan). Additional TS may also be identified during the FA/RPA process. TS will include the following evaluations:

   a. Installation and operation of a system designed to convert in-situ or recover and control migration of solid waste and constituents in ground water;

   b. Installation and operation of a system designed to recover and control migration of solid waste and constituents in surface water;

   c. any additional candidate technologies for a TS program. The listing of candidate technologies will cover the range of technologies required for alternatives analysis.

2. TS Requirements The specific data requirements for the testing program will be determined and refined during the FA and RPA. The TS shall include the following:

   a. Literature Survey: The Respondents will conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for this site on the basis of available information, treatability testing will be conducted.

   b. Evaluate TS: Once a decision has been made to perform treatability studies, the Respondents and the EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to ensure that results are integrated into the evaluation of remedial procedure alternatives within the RPA.

3. Implementation of TS

Where a TS Program is conducted, the deliverables that are required include a workplan, a sampling and analysis plan, and a final treatability evaluation report.

   a. Treatability Testing Workplan

      (1) Respondents shall submit to the EPA a TS Workplan, for EPA review, modification, and approval.

      (2) The TS Workplan shall describe the sites background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, residual waste handling and schedule (e.g., testing, deliverables, etc.). The data quality objectives (DQO) for treatability testing should be documented as well. If pilot scale treatability testing is to be performed, the pilot-scale workplan will describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, operating conditions to be tested, a sampling plan to determine pilot plant performance, and a detailed health and safety plan. If testing is to be performed off-site, permitting requirements will be addressed.

   b. Sampling and Analysis Plan (SAP)

      (1) If the original FA Workplan is not adequate for defining the activities to be performed during the TS program, the TS Workplan shall include a treatability study SAP, or amendment to the original FA Workplan.

(2) Respondents shall submit the SAP as an element of the Draft TS Workplan.

c. Treatability Study

(1) The Respondents shall complete TS activities according to the schedule described in the Workplan, and submit to the EPA a Draft TS Report for review and approval by the EPA.

(2) After receipt of the EPA's comments on the Draft TS Report, Respondents shall submit a Final TS Report which addresses all of the EPA's comments to the satisfaction of the EPA.

(3) The TS Report will evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

G. PROGRESS REPORTS

The Respondents shall at a minimum provide the state and the EPA with signed, monthly FA progress reports containing:

1. A description and estimate of the percentage of the FA completed;
2. Summaries of all findings;
3. Summaries of all changes made in the FA during the reporting period;
4. Summaries of all contacts with representatives of the local community, public interest groups or the state government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in contact personnel during the reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

III. REMEDIAL PROCEDURES ANALYSIS (RPA)

A. PURPOSE

Based on the results of the FA, and the results of any treatability studies, the Respondents shall identify, screen and develop the alternatives for removal, containment, treatment and/or other remediation of the contamination that has been identified at the Facilities.

B. SCOPE

The Remedial Procedures Analysis (RPA) program consists of three tasks:

1. Identification and Development of Remedial Action Alternatives
2. Evaluation of the Remedial Procedure Alternatives
3. Reports

C. IDENTIFICATION AND DEVELOPMENT OF THE REMEDIAL ACTION ALTERNATIVES

1. Establishment of Remedial Action Objectives

The Respondents shall propose Facility specific objectives for remedial action, subject to EPA review and approval, as an element of the RPA Report. These objectives shall be based on media cleanup standards, human health and environmental criteria, source control, information gathered during the FA and Initial Actions, EPA guidance, and the requirements of any applicable state and federal statutes and regulations.

2. Identification, Screening, and Development of Remedial Procedure Alternatives

a. Identification: The Respondents shall review the results of the FA and identify technologies which are applicable at the Facilities. The Respondents shall list and describe potentially applicable technologies for each affected media that may be used to achieve the remedial action objectives. The Respondents shall include a table that summarizes the available technologies. Depending on the site-specific conditions, the EPA may require the Respondents to include additional technologies. The Respondents shall include innovative remedial action technologies when appropriate, especially in situations where there are a limited number of applicable existing remedial procedure technologies.

The Respondents shall rely on standard engineering practice to determine which of the previously identified technologies appear most suitable for the Facilities. Technologies can be combined to form the overall remedial action alternatives. The alternatives developed should represent a workable number of option(s) that each appear to adequately address all site problems and remedial action objectives. Each alternative may consist of an individual technology or a combination of technologies.

b. Screening The Respondents shall screen the preliminary remedial procedure technologies identified to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or

reliably, or that do not achieve the remedial procedure objectives within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

The Respondents shall evaluate and document the technology limitations of the remedial procedure alternatives identified above which may prove infeasible to implement given the existing set of waste and site specific conditions.

Site, waste, and technology characteristics which are used to screen the remedial procedure technology alternatives are described in more detail below:

(1) Site Characteristics: Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration.

(2) Waste Characteristics: Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

(3) Technology Limitations: During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified and supported by performance data for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

c. Development: Utilizing the technologies which are not eliminated in the screening process outlined above, the Respondents shall identify remedial procedure alternatives to achieve the established remedial action objectives.

D. EVALUATION OF THE REMEDIAL PROCEDURE ALTERNATIVES

The Respondents shall describe and evaluate each remedial procedure alternative that passes through the Initial Screening. For each alternative which warrants a more detailed evaluation, including those situations when only one alternative is being proposed, the Respondents shall provide detailed documentation of how the potential remedy will comply with each of the standards listed below. These standards reflect the major remedial action

objectives and components of remedies including cleanup of releases, source control and handling of wastes that are generated by remedial activities. The Respondents shall also provide detailed documentation for each of the additional evaluation criteria which supports the use of viable remedial alternatives.

1. Protective of Human Health and the Environment The standard for protection of human health and the environment is a general mandate derived from the RCRA statute. This standard requires that remedies include those measures that are needed to be protective, but are not directly related to media cleanup, source control, or handling of wastes. An example would be a requirement for the construction of barriers or for other controls to prevent harm arising from direct contract with waste management units. Therefore, the Respondents shall include in the RPA Report a discussion on what types of short term remedies are appropriate for each of the particular Facilities in order to meet this standard. This information shall be provided in addition to a discussion of how the other remedial procedure alternatives meet this standard.

2. Attain Media Cleanup Standards Remedial procedures shall be required to attain media cleanup standards set by state or federal regulations (e.g., ground water standards). The media cleanup standards for a remedial procedure will often play a large role in determining the approach of implementing the remedy.

   As part of the necessary information for satisfying this requirement, the Respondents shall address whether the potential remedial procedure will achieve the remedial action objective, as approved by the EPA, as well as other, alternative remediation objectives that may be proposed by the Respondents. The Respondents shall also include an estimate of the time frame necessary for each alternative to meet these standards.

3. Control the Sources of Contamination A critical objective of any remedial procedure must be to stop further environmental degradation by controlling or eliminating further releases that may pose a threat to human health and/or the environment. Unless source control measures are taken, efforts to clean up releases may be ineffective or, at best, will essentially involve a perpetual cleanup. Therefore, an effective source control program is essential to ensure the long-term effectiveness and protectiveness of the remedial action program.

   The proposed source control standard is not intended to mandate a specific remedy or class of remedies. Instead, the Respondents are encouraged to examine a wide range of options. This standard should not be interpreted to preclude the equal consideration of using other protective remedies to control the source, such as partial waste removal, capping, slurry walls, in-situ treatment/stabilization and

consolidation. Source controls may need to be combined with other measures, such as plume management or exposure controls, to ensure an effective and protective remedy.

4. Comply with Any Applicable Standards for Handling of wastes. The Respondents shall include a discussion of how the specific waste management activities will be conducted in compliance with all applicable state or federal regulations (e.g., CAMU closure requirements, land disposal restrictions).

5. Long-term Reliability and Effectiveness In evaluating the long-term reliability and effectiveness of a remedial procedure, the EPA will place an emphasis on its ability to provide adequate protection of human health and the environment over the long term. Thus, source control technologies that involve treatment of wastes, or that otherwise do not rely on containment structures or systems to ensure against future releases, will be strongly preferred to those that offer more temporary, or less reliable, controls.

   Demonstrated and expected reliability is a way of assessing the risk and effect of failure. The Respondents shall consider whether the technology, or combination of technologies, has been used effectively together under analogous site conditions, whether failure of any one technology in the alternative will have an immediate impact on receptors, and whether the alternative will have the flexibility to deal with uncontrollable changes at the site (e.g., heavy rain storms, earthquakes, etc.).

   Most remedial procedure technologies, with the exception of destruction, deteriorate with time. Often deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each remedial procedure alternative shall be evaluated in terms of the projected useful life of the overall alternative and of its component technologies. Useful life is defined as the length of time the remedial action objective can be maintained.

6. Reduction in the Toxicity, Mobility or Volume of Wastes As a general goal, remedies will be preferred that employ techniques, such as treatment technologies, that are capable of eliminating or substantially reducing the inherent potential for the wastes in the infra-structure at the Facilities to cause future environmental contamination or other risks to human health and the environment. Estimates of how much the remedial alternatives will reduce the waste toxicity, volume, and/or mobility may be helpful in applying this factor. This may be done through a comparison of initial site conditions to post-remedial procedure conditions.

7. Short-term Effectiveness Short-term effectiveness may be particularly relevant when remedial activities will be conducted in densely populated areas, or where waste characteristics are such that risks to workers or the environment are high and special protective measures are needed. Possible factors to consider include

exposure to solid waste and potential threats associated with treatment, excavation, transportation, and redisposal or containment of waste material.

8. Implementability Implementability will often be a determining variable in shaping remedies. Some technologies will require state or local approvals prior to construction, which may increase the time necessary to implement the remedy. In some cases, state or local restrictions or concerns may necessitate eliminating or deferring certain technologies or remedial approaches from consideration in remedy selection. Information to consider may include, but not be limited to:

   a. Additional time of administrative activities (e.g., permits, rights of way, off-site approvals, etc.) required prior to implementing the remedial procedure alternative;

   b. The availability of adequate off-site treatment, storage capacity, disposal services, needed technical services and materials;

   c. The availability of prospective technologies for each remedial procedure alternative;

   d. Constructability is determined by conditions both internal and external to the Facilities conditions and include such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the Facilities (i.e., remote location vs. a congested urban area). The Respondents shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

   e. Time has two components that shall be addressed: the time it takes to implement a remedial procedure and the time it takes to actually see beneficial results.

9. Cost Estimate The Respondents shall develop an estimate of the cost of each remedial procedure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

   a. Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs.

      (1) Direct capital costs include, but are not limited to:

         (a) Construction costs: Costs of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the remedial procedure;

(b) Equipment costs: Costs of treatment, containment, disposal and/or service equipment necessary to implement the action; these materials remain until the remedial action is complete;

(c) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and

(d) Buildings and services costs: Costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

(2) Indirect capital costs include, but are not limited to:

(a) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of remedial procedure alternatives;

(b) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

(c) Startup and initial evaluation and adjustment costs: Costs incurred during remedial procedure startup; and

(d) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate Facility characterization.

b. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a remedial procedure. The Respondents shall consider the following operation and maintenance cost components:

(1) Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

(2) Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;

(3) Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;

(4) Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;

(5) Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;

(6) Administrative costs: Costs associated with administration of remedial procedure operation and maintenance not included under other categories;

(7) Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

(8) Maintenance reserve and contingency funds: Annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance costs; and

(9) Other costs: Items that do not fit any of the above categories.

The relative cost of a remedial procedure may be an appropriate consideration, especially in those situations where several different technical alternatives to remediation will offer equivalent protection of human health and the environment, but may vary widely in cost. Cost estimates could include costs for: engineering, site preparation, construction, materials, labor, sampling/analysis, waste management/disposal, permitting, health and safety measures, a training, operation and maintenance, etc.

10. Public Involvement

After a RPA has been performed by the Respondents, and the EPA has selected a preferred alternative for proposal in the Statement of Basis, it is the EPA's policy to request public comment on the Administrative Record and the proposed remedial procedure(s). Changes to the proposed remedial procedure(s) may be made by the EPA after consideration of public comment. The EPA may also require that the Respondents perform additional remedial procedure studies. In the event that significant interest is expressed during the public comment period, a public meeting may be held to facilitate community participation. After consideration of the public's comment on the proposed remedial procedure(s), the EPA will develop the Final Decision and Response to Comments (RTC) to document the selected remedial procedure(s), the EPA's justification for such selection, and response to the public's comment. Additional public involvement activities may be necessary, based on Facility specific circumstances.

E. REPORTS

The Respondents shall submit a Remedial Procedures Analysis (RPA) Report presenting the results and recommending a remedial procedure alternative.

1. Progress Reports

The Respondents shall at a minimum provide the state and the EPA with signed, monthly RPA progress reports containing:

a. A description and estimate of the percentage of the RPA completed;

b. Summaries of all findings;

c. Summaries of all changes made in the RPA during the reporting period;

d. Summaries of all contacts with representatives of the local community, public interest groups or state government during the reporting period;

e. Summaries of all problems or potential problems encountered during the reporting period;

f. Actions being taken to rectify problems;

g. Changes in the personnel involved with the RPA during reporting period;

h. Projected work for the next reporting period; and

i. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

2. Remedial Procedures Analysis Report

The RPA Report shall at a minimum include:

a. A description of the Facilities;

b. Site topographic map;

c. Updated description of the current conditions at the Facilities;

(1) Summary of field studies (ground water and surface water); and

(2) Summary of treatability studies.

d. A description of the remedial action objectives;

e. A description of the potentially applicable technologies;

(1) Identification of technologies;

(2) Screening of technologies.

f. Description of potentially applicable technology limitations;

g. Description of remedial procedure alternatives identified after initial screening process;

(1) Preliminary design criteria;

(2) General operation and maintenance requirements; and

(3) Long-term monitoring requirements.

h. Description of the following remedial procedure standards and evaluation criteria:

(1) Protection of human health and the environment;

(2) Media cleanup standards;

(3) Contamination source control;

(4) Compliance with applicable standards for handling of wastes;

(5) Long-term reliability and effectiveness;

(6) Reduction in toxicity, mobility, or volume of wastes;

(7) Short-term effectiveness;

(8) Implementability;

(9) Cost estimates; and

(10) Public involvement.

IV. REMEDIAL PROCEDURES IMPLEMENTATION (RPI)

A. PURPOSE

The purpose of this Remedial Procedures Implementation (RPI) program is to design, construct, operate, maintain, and monitor the performance of the remedial procedure or procedures selected to protect human health and the environment. Respondents will furnish all personnel, materials and services necessary for the implementation of the remedial procedure or procedures.

B. SCOPE

The Remedial Procedures Implementation program consists of four tasks:

1. RPI Workplan
2. Remedial Procedure Design
3. Remedial Procedure Construction
4. Reports

C. RPI WORKPLAN

The Respondents shall submit a Final Remedial Procedures Implementation Workplan as described below and in accordance with the Order. The RPI Workplan shall include, but not be limited to, the following elements:

1. Program Management Plan

The Respondents shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of remedial procedure(s). The Plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Plan will also include a description of qualifications of key personnel directing the Remedial Procedure Implementation Program, including contractor personnel. The Plan shall include a schedule(s) for completion of Remedial Procedure Design.

2. Community Relations Plan The Respondents shall revise the Community Relations Plan as necessary to address the information needs of the community during design and construction activities.

   a. Specific activities which must be conducted during the design stage are the following:

      (1) Revise the Facilities Community Relations Plan to reflect knowledge of citizen concerns and involvement at this stage of the process; and

      (2) Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.

   b. Depending on citizen interest at the Facilities at this point in the remedial action process, community relations activities could range from group meetings to fact sheets on the technical status.

D. REMEDIAL PROCEDURE DESIGN

The Respondents shall prepare a Final Remedial Procedure Design (RPD) Report that addresses the requirements necessary to implement the selected remedial procedure(s) at the Facilities, as defined in the Remedial Procedures Analysis. The RPD Report shall include, but not be limited to, the following elements:

1. Design Plans and Specifications The Respondents shall develop clear and comprehensive design plans and specifications, which include but are not limited to the following:

   a. Discussion of the design strategy and the design basis, including:

      (1) Compliance with all applicable or relevant environmental and public health standards;

      (2) Compliance with all applicable biosecurity standards; and

      (3) Minimization of environmental and public impacts.

b. Discussion of the technical factors of importance including:

(1) Use of currently accepted environmental control measures and technology;

(2) Use of decontamination control measures;

(3) The constructability of the design; and

(4) Use of currently acceptable construction practices and techniques.

c. Description of assumptions made and detailed justification of these assumptions.

d. Discussion of the possible sources of error and references to possible operation and maintenance problems.

e. Detailed drawings of the proposed design including:

(1) Qualitative flow sheets; and

(2) Quantitative flow sheets.

f. Tables listing equipment and specifications.

g. Tables giving material and energy balances.

h. Appendices including:

(1) Sample calculations (one example presented and explained clearly for significant or unique design calculations); and

(2) Derivation of equations essential to understanding the RPD Report; and

(3) Results of laboratory and/or field tests.

2. Operation and Maintenance Plan The Respondents shall prepare an Operation and Maintenance Plan to cover both implementation and long term maintenance of the remedial procedure(s). The Plan shall be composed of, but not be limited to, the following elements:

a. Description of normal operation and maintenance (O&M) requirements:

(1) Description of tasks for operation;

(2) Description of tasks for maintenance;

(3) Description of prescribed treatment or operation conditions; and

(4) Schedule showing frequency of each O&M task.

b. Description of potential operating problems:

(1) Description and analysis of potential operation problems;

(2) Sources of information regarding problems; and

(3) Common and/or anticipated remedies.

c. Description of routine monitoring and laboratory testing:

(1) Description of monitoring tasks;

(2) Description of required laboratory tests and their interpretation;

(3) Required QA/QC; and

(4) Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

d. Description of alternate O&M:

(1) Should systems fail, alternate procedures to prevent undue hazard; and

(2) Analysis of vulnerability and additional resource requirements should a failure occur.

e. Safety plan:

(1) Description of precautions, of necessary equipment, etc., for site personnel; and

(2) Safety tasks required in event of system failure.

f. Description of equipment:

(1) Equipment identification;

(2) Installation of monitoring components;

(3) Maintenance of site equipment; and

(4) Replacement schedule for equipment and installed components.

g. Records and reporting mechanisms required:

(1) Daily operating logs;

(2) Laboratory records;

(3) Records for operating costs;

(4) Mechanism for reporting emergencies;

(5) Personnel and maintenance records; and

(6) Monthly reports to state agencies.

An initial Operation and Maintenance Plan shall be submitted with the Draft RPD Report and the Final Operation and Maintenance Plan with the Final Design Documents.

3. Cost Estimate The Respondents shall develop cost estimates for the purpose of assuring that the Facilities have the financial resources necessary to construct and implement the remedial procedure(s). The cost estimate developed in the Remedial Procedures Analysis shall be refined to reflect the more detailed and/or accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs. An initial Cost Estimate shall be submitted simultaneously with the Draft RPD Report and the Final Cost Estimate with the Final Design Documents.

4. Project Schedule The Respondents shall develop a detailed Project Schedule for construction and implementation of the remedial procedure(s), which identifies timing for initiation and completion of all critical path tasks. The Respondents shall specifically identify dates for completion of the project and major initial milestones which shall be enforceable terms of this Order. An initial Project Schedule shall be submitted simultaneously with the Draft RPD Report and the Final Project schedule with the Final Design Document.

5. Construction Quality Assurance Objectives The Respondents shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; and documentation.

6. Health and Safety Plan The Respondents shall modify the Health and Safety Plan developed for the Field Analysis to address the activities to be performed at the Facilities to implement the remedial procedure(s).

7. Design Phases The design of the remedial procedure(s) should include, but not be limited to, the phases outlined below:

   a. Draft Design The Respondents shall submit the Draft Design as an element of the Draft RPD Report. At this stage, the Respondents shall have field verified the existing conditions of the Facilities. The Draft Design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the Final Design will provide an operable and usable remedial procedure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The preliminary construction drawings by Respondents shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications. The Respondents shall include, with the Draft Design, design calculations reflecting the same percentage of completion as the designs they support.

   b. Intermediate Design Complex project design may necessitate review of the design documents between the Draft and the Final Design. At the discretion of

the EPA, a design review may be required at 60% completion of the design of the project. The Intermediate Design submittal should include the same elements as the Draft Design.

c. Correlating plans and specifications General correlation between drawings and technical specifications, is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, Respondents shall:

(1) Coordinate and cross-check the specifications and drawings; and

(2) Complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

These activities shall be completed prior to the 95% Draft Design submittal to the Agency.

d. Equipment start-up and operator training The Respondents shall prepare, and include in the technical specifications governing treatment systems, contractor requirements for providing the following elements: (1) appropriate service visits by experienced personnel to supervise the installation, adjustment, startup and operation of the treatment systems; and (2) training covering appropriate operational procedures once the startup has been successfully accomplished.

e. Additional Studies Remedial Procedures Implementation may require Additional Studies to supplement the available technical data. At the direction of the Agency for any such studies required, the Respondents shall furnish all services, including field work as required, materials, supplies, plant, labor, equipment, investigations, studies and superintendence. Sufficient sampling, testing and analysis shall be performed to optimize the required treatment and/or disposal operations and systems. There shall be an initial meeting of all principal personnel involved in the development of the program. The purpose will be to discuss objectives, resources, communication channels, role of personnel involved and orientation of the site, etc. The Initial Additional Studies report shall present the results of the testing with the recommended treatment or disposal system (including options). A review conference shall be scheduled after the initial report has been reviewed by all interested parties. The Final Additional Studies Report include all data taken during the testing and a summary of the results of the studies.

f. Draft and Final Design The Respondents shall submit the Draft and Final Design documents in two parts. The first submission shall be at 95% completion of design (i.e., Draft). After approval of the Draft submission, the Respondents shall execute the required revisions and submit the Final Design documents 100% complete with reproducible drawings and specifications.

The Draft Design submittal shall consists of the Design Plans and Specifications, Operation and Maintenance Plan, Capital and Operating and Maintenance Cost Estimate, Quality Assurance Plan and Specifications for the Health and Safety Plan and Project Schedule.

The Final Design submittal shall consist of the Final Design Plans and Specifications (100% complete), Respondents's Final Construction Cost Estimate, the Final Draft Operation and Maintenance Plan, Final Quality Assurance Plan and Health and Safety specifications. The quality of the design documents should be such that Respondents would be able to include them in a bid package and invite contractors to submit bids for the construction project.

E. REMEDIAL PROCEDURE CONSTRUCTION

The Respondents shall develop and implement a Construction Quality Assurance (CQA) Workplan to ensure, with a reasonable degree of certainty, that a completed remedial procedure(s) meets or exceeds all design criteria, plans and specifications. The Draft CQA Workplan shall be submitted to the EPA for review and approval concurrently with the Draft Design. The CQA Workplan is a Facility specific collection of documents which must be submitted to the EPA for review and approval prior to the start of construction. At a minimum, the CQA Workplan should include the elements which are summarized below. Upon EPA approval or modification of the CQA Workplan and Final Design, Respondents shall construct and implement the remedial procedure(s) in accordance with the approved design, schedule and the CQA Plan. Respondents shall also carry out all elements of the approved Operation and Maintenance Plan.

1. Responsibility and Authority The responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the remedial procedure(s) shall be described fully in the CQA Workplan. Respondents must identify a CQA officer and the necessary supporting inspection staff.

2. Construction Quality Assurance Personnel Qualifications The qualifications of the CQA Officer and supporting inspection personnel shall be presented in the CQA Workplan to demonstrate that they posses the training and experience necessary to fulfill their identified responsibilities.

3. Inspection Activities The observations and tests that will be used to monitor the construction and/or installation of the components of the remedial procedure(s) shall be summarized in the CQA Workplan. The Plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not limited to waste disposal records,

etc. The inspection should also ensure compliance with all biosecurity, health and safety procedures. In addition to oversight inspections, the Respondents shall conduct the following activities:

a. Pre-Construction Inspection and Meeting Respondents shall conduct a Pre-Construction Inspection and Meeting with the EPA to:

(1) Review methods for documenting and reporting inspection data;

(2) Review methods for distributing and storing documents and reports;

(3) Review work area security and safety protocol;

(4) Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

(5) Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The Pre-Construction Inspection and Meeting shall be documented by a designated person and minutes should be transmitted to all parties.

b. Pre-Final Inspection Upon preliminary project completion, the Respondents shall notify the EPA for the purposes of conducting a Pre-Final Inspection. The Pre-Final Inspection will consist of a walk-through inspection of each facility project site. The Inspection is to determine whether the project is complete and consistent with the contract documents and the EPA approved remedial procedure. Any outstanding construction items discovered during the Inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by Respondents. The Respondents will certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting will be completed where deficiencies are revealed. The Pre-Final Inspection Report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for Final Inspection.

c. Final Inspection Upon completion of any outstanding construction items, Respondents shall notify the EPA for the purposes of conducting a Final Inspection. The Final Inspection will consist of a walk-through inspection of each facility project site. The Pre-Final Inspection Report will be used as a checklist with the Final Inspection focusing on the outstanding construction items identified in the Pre-Final Inspection. Confirmation shall be made that outstanding items have been resolved.

4. Sampling Requirements The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specifications should be presented in the CQA Workplan.

5. Documentation Reporting requirements for CQA activities shall be described in detail in the CQA Workplan. This should include such items as daily summary reports, inspections data sheet, problem identification and remedial procedures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records also should be presented in the CQA Workplan.

F. REPORTS

The Respondents shall prepare plans, specifications, and reports to document the design, construction, operation, maintenance and monitoring of the remedial procedure. The documentation shall include, but not limited to the following:

1. Progress Reports The Respondents shall at a minimum provide the EPA with signed, monthly progress reports containing:
   a. A description and estimate of the percentage of the RPI completed;
   b. Summaries of all findings and data;
   c. Summaries of all changes made in the RPI during the reporting period;
   d. Summaries of all contacts with representative of the local community, public interest groups or state government during the reporting period;
   e. Summaries of all problems or potential problems encountered during the reporting period;
   f. Actions being taken to rectify problems;
   g. Changes in personnel associated with remedial procedures during the reporting period;
   h. Projected work for the next reporting period; and
   i. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.
2. Draft Reports
   a. Respondents shall submit a Remedial Procedure Implementation Workplan;
   b. Respondents shall submit a Draft Remedial Procedure Design Report, and in accordance with the EPA approved schedule included in the RPI Workplan;
   c. Respondents shall submit a Draft Construction Quality Assurance Workplan and in accordance with the EPA approved schedule included in the RPD Report; and

d. At the "completion" of the construction of the project, Respondents shall submit a Draft and Final Remedial Procedure Implementation Report to the EPA for review and approval. The RPI Report shall document that the project is consistent with the design specifications, and that the remedial procedure is performing adequately. The RPI Report shall include, but not be limited to the following elements:

(1) Synopsis of the remedial procedure(s) and certification of the design and construction;

(2) Explanation of any modifications to the plans and why these were necessary for the project;

(3) Listing of the criteria, established before the remedial procedure was initiated, for judging the functioning of the remedial procedure and also explaining any modification to these criteria;

(4) Results of the Facilities monitoring, indicating that the remedial procedure(s) will meet or exceed the performance criteria; and

(5) Explanation of the operation and maintenance (including monitoring) to be undertaken at the Facilities.

The RPI Report should include, but not be limited to, all of the daily inspection summary reports, inspection summary reports, inspection data sheets, problem identification and remedial procedure reports, evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from designated material specifications (with justifying documentation) and as-built drawings.

3. Final Reports After receipt of EPA's comments on the draft plans and reports included in this Scope of Work, Respondents shall finalize said plans and reports, including: (1) Final RPI Workplan; (2) Final RPD Report; (3) Final CQA Workplan; and (4) Final RPI Report. The final plans and reports shall address all of EPA's comments to the satisfaction of the EPA.